SOFT MATTER INTERFACES (SMI)

Group Leader: Elaine DiMasi[1] Proposal Team: E. DiMasi[1], A. Fluerasu[1], M. Fukuto[1], O. Gang[1], B. Hsiao[2], J. Kline[3], T. Koga[2], I. Kuzmenko[4], **B. Ocko[1]**, R. Pindak[1], M. Schlossman[4], H. Strey[2], D. Vaknin[5], L. Wiegart[1], T. Xu[6], K. Yager[1], L. Yang[1], J. Zhang[4]
[1]Brookhaven National Laboratory, [2]Stony Brook University, [3]NIST, [4]Argonne National Laboratory, [5]University of Illinois, [6]Ames Laboratory, [7]University of California, Berkeley

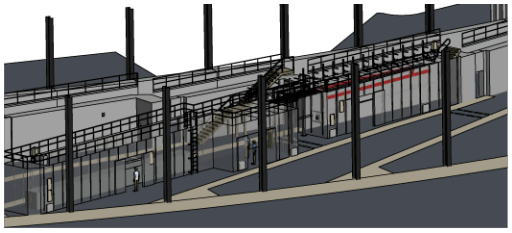
BROOKHAVEN NATIONAL LABORATORY

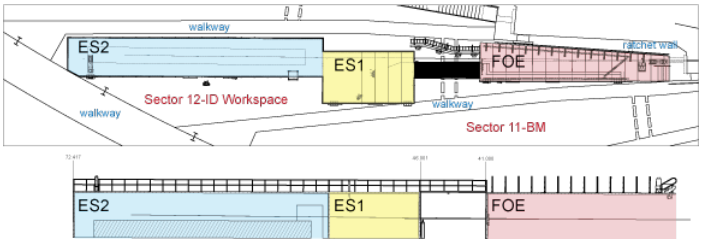
NATIONAL SYNCHROTRON LIGHT SOURCE II • NEXT project • funded by DOE

TECHNIQUES AND CAPABILITIES

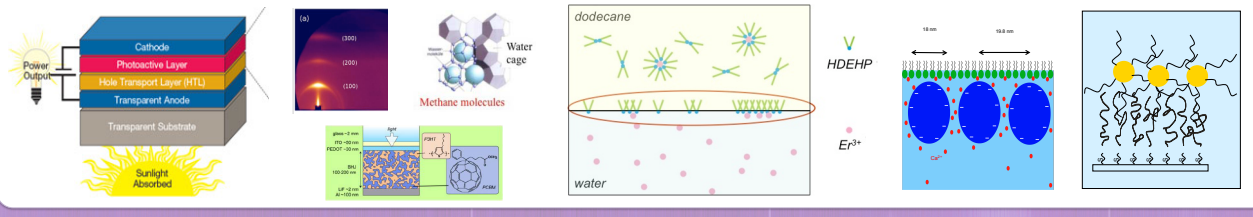
- Enables in-situ studies of soft-matter interface structures using specialized surface sensitive x-ray scattering techniques.
- Two dedicated endstations will allow studies to be carried out at the solid/vapor, solid/liquid, liquid/vapor, liquid/solid and liquid/liquid interfaces, with new tender energy capabilities.
- The high brightness of NSLS-II will enable microbeam modes, high *q* resolution, time resolved measurements, and a wide *q* range for simultaneous data acquisition.

- Simultaneous GISAXS / GIWAXS / GIXD
- Diffuse scattering, bragg rods
- Fast x-ray reflectivity from liquid interfaces
- Predicting 10^{15} ph/s from undulator source
- Energy range 2 to 24 keV
- Energy tunability for resonant studies
- Beam size 5-500 μm × 2-100 μm (*h*×*v*)
- Configurable horizontal & vertical focusing





APPLICATIONS in ENERGY, ENVIRONMENT, and BIOMOLECULAR MATERIALS



ENERGY

Microphase behavior and molecular orientations in thin film organic photovoltaic devices and organic LEDs, promising new classes of energy materials; gas hydrate formation at the gas-water interface; structure-function relation in device materials

ENVIRONMENT

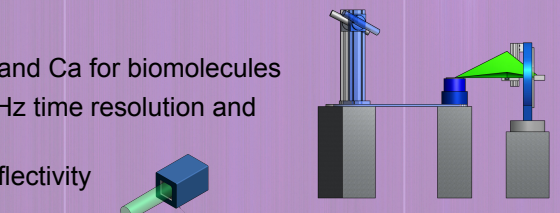
Extractant-mediated transfer of metal ions from aqueous to immiscible organic phase; carbonate mineralization for carbon sequestration

BIOMOLECULAR MATERIALS

Fundamental understanding of self-assembly to create new functional bio, nano, hybrid, and hierarchical materials

INSTRUMENTATION ADVANCES

- Windowless path 2-4 keV for resonance from P, S, Cl, K, and Ca for biomolecules
- Simultaneous small and wide angle scattering with > 200Hz time resolution and new data visualization
- New capabilities for Liquids with tender x-rays and fast reflectivity



Poster created by Lutz Wiegart, Interim Project Leader, 2011.
Updated by SMI Beamline Development Group, Elaine DiMasi, Warren Halbig, and Amanda King, 2012.